

In support of this rejection, the Office Action asserts:

“the claimed nucleic acids lack a patentable utility because Applicants haven’t demonstrated that the claimed nucleic acids indeed exhibited [sic] the asserted utility of glutamyl tRNA reductase enzyme. The only evidence to which Applicants are relying upon is the percent similarity of the sequence of the claimed nucleic acid and the sequence of glutamyl tRNA reductase.”

Office Action mailed July 16, 2001, Paper No. 17, page 3, first full paragraph.

It is well-established that “when a properly claimed invention meets at least one stated objective, utility under section 101 is clearly shown.” *Raytheon Co. v. Roper Corp.*, 724 F.2d 951, 958, 220 USPQ 592, 598 (Fed. Cir. 1983). The present specification describes many objectives that are met by the present invention including, but not limited to providing a substantially purified nucleic acid sequence which encodes a glutamyl tRNA reductase (“GluTR”) or fragment thereof. *See Specification*, Summary of the Invention.

The Office Action asserts that Applicants have not demonstrated that the claimed nucleic acid sequences encode a product with the same function as GluTR. Applicants respectfully disagree. The specification provides evidence based on sequence identity (Table A) that the disclosed genes encode polypeptides having GluTR activity. Moreover, the specification teaches that the deduced amino acid sequence of GluTR from all species exhibit about 60% overall similarity with stretches of amino acid identity. In particular, barley, *Arabidopsis*, and cucumber exhibit over 70% identity at the deduced amino acid level. *See id.* at 5. Further, the specification teaches that GluTR generally has a molecular weight of about 270 kD among species. *See id.* at page 4. As such, it is submitted that sequence homology is indeed an adequate and predictable indicator of GluTR functionality. Thus, based on such teachings, one of ordinary skill in the art would immediately appreciate the usefulness of the claimed nucleic acid molecules.

An examiner must accept a utility asserted by an applicant unless the Office has evidence or sound scientific reasoning to rebut the assertion. *See In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). “More specifically, when a patent application claiming a nucleic acid asserts a specific, substantial, and credible utility, and bases the assertion upon homology to existing nucleic acids or proteins having an accepted utility, the asserted utility must be accepted by the examiner unless the Office has sufficient evidence or sound scientific

reasoning to rebut such an assertion.” Federal Register 66(4):1096, Utility Guidelines (2001). “[A] ‘rigorous correlation’ need not be shown in order to establish practical utility; ‘reasonable correlation’ is sufficient.” *Fujikawa v. Wattanasin*, 93 F.3d 1559, 1565, 39 USPQ2d 1895, 1900 (Fed. Cir. 1996).

As such, an examiner “must do more than question operability – [the examiner] must set forth factual reasons which would lead one skilled in the art to question the objective truth of the statement of operability.” *In re Gaubert*, 524 F.2d 1222, 1225-26, 187 USPQ 664, 666 (CCPA 1975); *see In re Brana*, 51 F.3d 1560, 1567, 34 USPQ2d 1436, 1441 (Fed. Cir. 1995); MPEP § 706.03(a)(1). No such factual reasons have been provided. The Office Action provides a list of general publications which allege general unpredictability in sequence similarity analysis. *See Office Action* at page 3. However, the asserted publications do not specifically relate to GluTR, nor do they bring into doubt the teachings of the specification regarding the well-conserved nature of GluTR sequences across species. Thus, the Office Action assertion regarding the unpredictability of sequence homology analysis is not a sufficient factual reason to question the truth of the disclosed operability. The utilities disclosed by Applicants must be accepted as factually sound unless and until the Patent Office provides factual reasons that undermine the credibility of the assertion. Therefore, the Office has not met the requisite burden to impose a 35 USC § 101 rejection.

In sum, Applicants have asserted substantial, specific utilities for the claimed nucleic acid molecules of the invention, and absent specific evidence to the contrary, this assertion must be accepted. Applicants have asserted a number of utilities for which the nucleic acids molecules of the invention can be used. These include, but are not limited to, determining the expression levels of GluTR enzymes involved in the tetrapyrrole pathway in plants (page 40-43); detecting mutations in the genes encoding these enzymes (page 43-46); and producing plants with altered expression of GluTR (page 46-51). As such, Applicants have met their burden in establishing specific, “real-world” utilities for the claimed invention.

In view of the above, Applicants contend that the claimed nucleic acid molecules are supported by specific and well-established utilities as disclosed in the specification. As such, withdrawal of this rejection is respectfully requested.

II. Rejection under 35 USC §112, 1st Paragraph, Enablement

Claims 11-21 stand rejected under 35 USC § 112, 1st Paragraph because the claimed invention is allegedly not supported by either a specific and substantial asserted utility or a well established utility. This rejection is traversed for the reasons discussed above with regard to the 35 USC §101 rejection. As such, it is submitted that the specification enables one of skill in the art to use the invention in accordance with the asserted specific and substantial utilities discussed above. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 1, 2, and 10 also stand rejected under 35 USC § 112, 1st Paragraph as allegedly containing subject matter which was not described in the specification in such a way as to enable one of skill in the art to make and/or use the invention.

Initially, it is submitted that the Examiner has not met the evidentiary burden to impose an enablement rejection for failure to enable one of skill to use the invention. A specification that discloses how to use a claimed invention “must be taken as in compliance with the enabling requirement of the first paragraph of § 112 unless there is reason to doubt the objective truth of the statements contained therein.” *In re Brana*, 51 F.3d 1560, 1566, 34 USPQ2d 1436, 1441 (Fed. Cir. 1995) (quoting *In re Marzocchi*, 439 F.2d 220, 223, 169 USPQ 367, 369 (CCPA, 1971) (emphasis in original)). It is also well-established that “the enablement requirement is met if the description enables any mode of making and using the invention.” *Johns Hopkins University v. CellPro*, 152 F.3d 1342, 1361, 47 USPQ2d 1705, 1719 (Fed. Cir. 1998) (emphasis added) (quoting *Engel Indus. v. Lockformer Co.*, 946 F.2d 1528, 1533, 20 USPQ2d 1300, 1304 (Fed. Cir. 1991)).

The present specification indeed discloses how to use the claimed invention as discussed above. The Office Action has failed to provide specific evidence supporting this rejection, nor any specific explanation of why the specification allegedly fails to enable these uses. See *In re Wright*, 999 F.2d 1557, 1561-62, 27 USPQ2d 1510, 1513 (Fed. Cir. 1993); *Ex parte Lemak*, 210 USPQ 306, 307 (Bd. App. 1981) (“pure conjecture” does not substantiate rejection for lack of enablement). For at least this reason, withdrawal of this rejection is respectfully requested.

Additionally, the Office Action asserts that undue experimentation would be required to make and use the invention as it is claimed because the specification allegedly fails to teach the disclosed sequences as being useful as GluTR. See *Office Action* at page 5. The Office Action

further contends that it would require undue experimentation to practice the claimed invention because the specification does not provide “teaching or guidance demonstrating that the disclosed nucleic acid sequences have the same function as glutamyl t-RNA reductase enzyme.” *Id.* at page 6-7. Applicants traverse these general characterizations.

Even assuming, *arguendo*, that the Office Action’s generalization regarding the unpredictable state of the art is accepted, the conclusion that undue experimentation would be required is inconsistent with the current state of the law. Specifically, the law provides that experimentation is not necessarily undue simply because it is complex, if the art typically engages in such experimentation. *See In re Certain Limited-Charge Cell Culture Microcarriers*, 221 USPQ 1165, 1174, (Int’l Trade Comm’n 1983) *aff’d. sub nom.*, *Massachusetts Institute of Technology v. A.B. Fortia*, 774 F.2d 1104, 227 USPQ 428 (Fed. Cir. 1985). Therefore, in the present case, the Examiner’s citation to the complex nature of the art only goes to substantiate the fact that experimentation is typical within the art.

A reasonable analysis of the *In re Wands* criteria also supports Applicants position that no undue experimentation would be required to make and use the claimed invention. *See In re Wands*, 858 F.2d 731, 737, 8 USPQ2d 1400, 1404 (Fed. Cir. 1998). The first *Wands* criterion is the quantity of experimentation necessary. The “make-and-test” quantum of experimentation is reduced by the extensive knowledge, *e.g.*, of conservative nucleotide substitutions, identification of an active site, and radiometric synthase assay conditions, to which a person of ordinary skill in the art has access. Performing routine and well-known steps, such as sequence alignment protocols, molecular weight determination, and antibody hybridization assays, cannot create undue experimentation even if it is laborious. *See In re Angstadt*, 537 F.2d 498, 504, 190 USPQ 214, 218-219 (CCPA. 1976).

Moreover, as discussed *supra*, the specification provides evidence based on sequence identity (Table A) that the disclosed genes encode polypeptides having GluTR activity. Moreover, the specification teaches that the deduced amino acid sequence of GluTR from all species exhibit about 60% overall similarity with stretches of amino acid identity. In particular, barley, *Arabidopsis*, and cucumber exhibit over 70% identity at the deduced amino acid level. *See id.* at 5. Further, the specification teaches that GluTR generally has a molecular weight of about 270 kD among species. *See id.* at page 4. As such, it is submitted that sequence homology

is indeed an adequate and predictable indicator of GluTR functionality. As such, one of ordinary skill in the art would clearly understand from the teachings of the specification that the claimed nucleic acid sequences have GluTR activity without the need for undue experimentation.

The second and third *Wands* criteria relate to the amount of direction or guidance given, and the presence or absence of working examples. Again, the specification provides evidence of sequence identity, discloses a general range of molecular weight, and discusses the use of GluTR specific antibodies. Based on such disclosure, one of ordinary skill in the art would be enabled to make and use the invention commensurate in scope with the claims.

The fourth, fifth, and sixth *Wands* criteria focuses on the nature of the invention, the state of the art, and the relative skill in the art. The present invention relates to nucleic acid and amino acid sequences, and constructs and methods related thereto. Practitioners in this art are guided by considerable knowledge and resources on the conditions and approaches that can be utilized to identify, confirm, and introduce into other hosts, nucleic acid and amino acid sequences.

The seventh criterion considers the predictability of the art. The Office Action alleges that “the citation of sequence similarity results in an unpredictable and therefore unreliable correspondence between the claimed biomolecule and the indicated similar biomolecule of known function.” *Office Action* at page 6. Applicants respectfully disagree and assert, as discussed *supra*, that the specification discloses sufficient guidance to render the results predictable.

The eighth criterion focuses on the breadth of the claims. Enablement is satisfied when the disclosure “adequately guide[s] the art worker to determine, without undue experimentation, which species among all those encompassed by the claimed genus possess the disclosed utility”. *See In re Vaeck*, 947 F.2d 488, 496, 20 USPQ2d 1438, 1445 (Fed. Cir. 1991). In the present case, one of skill in the art is specifically guided by the disclosure to look to, *e.g.*, sequence identity data, molecular weight data, and antibody binding, in making that determination.

Accordingly, for at least these reasons, the enablement rejection under 35 USC § 112, 1st paragraph, is traversed, and withdrawal of this rejection is respectfully requested.

III. Rejection under 35 USC §112, 1st Paragraph, Written Description

Claims 1, 2, and 10-21 stand rejected under 35 USC §112, 1st paragraph, as allegedly containing subject matter which was not described in the specification in a manner that reasonably conveys to one of ordinary skill in the art that the inventors had possession of the claimed invention at the time of filing. This rejection is respectfully traversed for at least the reasons which follow.

The purpose of the written description requirement is simply to ensure that the inventors had possession of the claimed subject matter, *i.e.*, to ensure that the inventors actually invented what is claimed. See *Gentry Gallery Inc. v. Berkline Corp.*, 134 F.3d 1473, 1479, 45 USPQ2d 1498, 1503 (Fed. Cir. 1998); *Lockwood v. American Airlines*, 107 F.3d 1565, 1572, 41 USPQ2d 1961, 1966 (Fed. Cir. 1997); *In re Alton*, 76 F.3d 1168, 1172, 37 USPQ2d 1578, 1581 (Fed. Cir. 1996). In accordance with this purpose, Applicants need not “describe,” in the sense of Section 112, all things that are encompassed by the claims. To contend otherwise would contradict established jurisprudence, which teaches that a patent may be infringed by technology developed after a patent issues. *United States Steel Corp. v. Phillips Petroleum Co.*, v865 F.2d 1247, 1251, 9 USPQ2d 1461, 1464 (Fed. Cir. 1989).

A related and equally well-established principle of patent law is that claims “may be broader than the specific embodiment disclosed in a specification.” *Ralston Purina Co. v. Farmor-Co*, 772 F.2d 1570, 1575, 227 USPQ 177, 179 (Fed. Cir. 1985) (*quoting In re Rasmussen*, 650 F.2d 1212, 1215, 211 USPQ 323, 326 (CCPA. 1981)). Thus, simply because the claimed nucleic acid sequences may also include sequences from other species does not require that Applicants describe each and every one of these molecules. Further, “a description as filed is presumed to be adequate, unless and until sufficient evidence or reasoning to the contrary has been presented by the examiner to rebut the presumption.” *Federal Register* 66(4):1107, Written Description Guidelines (2001). In this regard, the Examiner is required to disclose “express findings of fact which support the lack of written description conclusion.” *Id.*

Applicants have provided detailed chemical structures of the claimed nucleic acid sequences, as well of average molecular weights for the full-length encoded GluTR enzyme. These sequences provide “structural feature[s] possessed by members of the [claimed] genus that

distinguish[] them from others.” *Regents of the University of California v. Eli Lilly and Co.*, 119 F.3d 1559, 43 USPQ2d 1398 (Fed. Cir. 1997). In contrast to the mere name “cDNA” provided in *Eli Lilly*, Applicants have provided detailed chemical structures. For at least this reason, it is respectfully submitted that the present claims meet the written description provision under 35 USC § 112, 1st paragraph.

The use of open claiming language (comprising) or semi-open claiming (consisting essentially of) does not alter the fact that a skilled artisan would readily envision adequate written description support. The fact that nucleic acid sequences may be added to either end of the recited sequence is beside the point. Applicants have therefore reasonably conveyed to one skilled in the art possession of the claimed invention, even when additional sequences are added to either end. Indeed, as disclosed in the specification on pages 58-59, the additional of, for example, detectable labels or extra nucleotides are readily envisioned by those of ordinary skill upon reading the present specification.

Additionally, “it may not be necessary to enumerate a plurality of species if a genus is sufficiently identified in an application by ‘other appropriate language.’” *Elli Lilly* at 1569. In the present case, it is submitted that the disclosure of a limited number of GluTR sequences in combination with “other appropriate language” in fact does provide sufficient written description for claims within the genus. Such “other appropriate language” is found, *e.g.*, in the form of sequence identity and numerous methodologies to obtain additional sequences. Therefore, it is clear that one of ordinary skill in the art would recognize that Applicants were in possession of the genus of GluTR encoding genes.

Accordingly, for at least the foregoing reasons, the rejection under 35 USC. §112, 1st paragraph, written description, is traversed, and withdrawal of this rejection is respectfully requested.

CONCLUSION

In view of the foregoing amendments and remarks, it is respectfully submitted that the present application is now in condition for allowance, and notice of such is respectfully requested.

The Examiner is encouraged to contact the undersigned should any additional information be necessary for allowance.

Respectfully submitted,



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